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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/643,629
Filing Date: August 18, 2003
Appellant(s): LI ET AL.

Robert S. Chee
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 7, 2008 appealing from the Office action mailed July 12, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,324,533 AGRAWAL et al. 11-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21 – 28 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,324,533 (henceforth referred to as Agrawal et al.).

Claim 21 is anticipated by the well-known apriori method as disclosed by Agrawal et al. as follows: A method for performing a frequent itemset operation, the method comprising the steps of: performing the frequent itemset operation in a plurality of phases, wherein each phase is associated with combinations that have a particular number of items (C5:L32-34); during at least one phase of the plurality of phases, performing the steps of determining candidate combinations that are to be evaluated during the phase (C5:L37-41); grouping the candidate combinations into clusters based on which items are included in said candidate combinations (C5:L41-47); processing said candidate combinations, based on said clusters, to determine whether the candidate combinations satisfy a frequency criteria associated with said frequent itemset operation (C5:L47-50); and storing, in a computer-readable medium, data that

indicates which candidate combinations satisfy the frequency criteria associated with said frequent itemset operation (The frequent 1-itemsets and 2-itemsets are generated by referring a transaction table to obtain candidate set of (n+2)-itemsets and frequent (n+2)-itemsets using a query operation. The generation of frequency itemsets is repeated until the candidate set is empty. The mining rules are generated from the union of determined frequency itemsets. See abstract and C4: L57-67).

Claim 23 is anticipated by Agrawal et al. as in claim 21, **wherein the step of grouping the candidate combinations into clusters includes the step of establishing an ordering for said candidate combinations by sorting the candidate combinations relative to each other based on the items within each of the candidate combinations** (figure 7 step 71; C6:L67-C7:L1, a lexicographical ordering will ensure that the subsets are ordered by the item names included in the subset).

Claim 25 is anticipated by Agrawal et al. as in claim 23, **wherein the step of processing the candidate combinations based on the clusters includes processing the candidate combinations in a sequence based on said ordering** (C7:L4-14).

Claim 27 is anticipated by Agrawal et al. as in claim 21, **wherein the step of grouping the candidate combinations into clusters includes hashing the candidate combinations into buckets based on the items that the candidate combination contain** (C12:L48-55; C13:L13-22).

Claims 22, 24, 26, and 28 are essentially the same as claims 21, 23, 25 and 27 except it recites a computer-readable storage medium and therefore, the subject matter of these claims are rejected for the same reasons as applied hereinabove.

Allowable Subject Matter

Claims 29 – 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

(10) Response to Argument

Appellant's arguments regarding the rejection of claims 21 – 28:

Argument No. 1: While it is true that Agrawal describes an approach for performing a frequent itemset operation in phases, Agrawal lacks any teaching or suggestion of anything analogous to a cluster as claimed (Page 5, The Brief).

Argument No. 2: Agrawal does not group any candidate combination into clusters after "determining candidate combinations that are to be evaluated during the phase" (Page 6, The Brief).

Argument No. 3: The examiner has failed to demonstrate that Agrawal discloses or anticipated all of the limitations of claimed invention (Page 7, The Brief).

Argument No. 4: Nothing in the cited portions of Agrawal anticipates hashing the candidate combinations into buckets (Page 11, The Brief).

Examiner's Response to Arguments:

In response to above Arguments, let's first clarify what appellant teaches about clustering. The Appellant teaches in Clustering Combinations section of the specification, the term **"cluster"** refers to **a set of combinations** that have a base bitmap in common. **The concept of clustering is multi-layered.** For example, all combinations that include the prefix (a, b, c, . . .) may be considered a first cluster, and all combinations that include the prefix (a, b, . . .) may be considered a second cluster, where the second cluster is a superset of the first cluster. By processing combinations in a sequence that is based on clusters, it is possible to know when cluster bitmaps can be discarded. For example, the cluster bitmap B(a, b, c) may be discarded after being used to generate the bitmaps for the combinations that belong to the first cluster. Similarly, the cluster bitmap B(a, m, n) may be discarded after being used to generate the bitmaps for the combinations that belong to the second cluster. Various techniques may be used to **cluster the combinations** that **are being processed at a particular phase of a frequent itemset operation**. For example, according to one embodiment, the items within a combination are sorted based on some ordering criteria, and then the combinations themselves sorted relative to each other based on the same ordering criteria. Another technique for clustering combinations involves hashing the combinations into buckets based on sub-combinations.

In response to Applicants' argument, Examiner is entitled to give claim limitations their broadest reasonable interpretation in light of the specification. See MPEP 2111 [R-1] Interpretation of Claims-Broadest Reasonable Interpretation

During patent examination, the pending claims must be 'given the broadest reasonable interpretation consistent with the specification.' Applicant always has the opportunity to amend the claims during prosecussion and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. In re Prater, 162 USPQ 541,550-51 (CCPA 1969).

Agrawal teaches a method for identifying rules from an integrated database and data-mining system, where the system includes a database in the form of a table of transactions and a query engine. The method includes the steps of: a) performing a **group-by query** on the transaction table **to generate a set of frequent 1-itemsets**; b) determining frequent 2-itemsets from the frequent 1-itemsets and the transaction table; c) **generating a candidate set of (n+2)-itemsets from the frequent (n+1)-itemsets**, where n=1; d) **determining frequent (n+2)-itemsets from the candidate set of (n+2)-itemsets** and the transaction table using a query; e) repeating steps (c) and (d) with n=n+1 until the candidate set is empty; and f) generating rules from the union of the determined frequent itemsets. The above teaching clearly teaches Appellant's claimed clustering as argued.

Agrawal further teaches the group-by query preferably includes the steps of counting the number of transactions that contain each item and selecting the items that

have a support above a user-specified threshold in determining the frequent 1-itemsets. The support of an item is the number of transactions that contain the item. In determining the frequent 2-itemsets, each 1-itemset is joined with itself and two copies of the transaction table using join predicates. The joining results for a pair of items are grouped together in counting the support of the items in the pair. All 2-itemsets that have a support below a specified threshold are removed from the set of 2-itemsets, resulting in the frequent 2-itemsets. Preferably, the candidate (n+2)-itemsets are generated using an (n+2)-way join operation. Also, **the frequent (n+2)-itemsets are determined using an (n+3)-way join query on the candidate itemsets** and (n+2) copies of the transaction table. The frequent (n+2)-itemsets are determined using cascaded subqueries by: a) selecting distinct first items in the candidate itemsets using a subquery; b) joining the distinct first items with the transaction table; c) cascading (n+1) subqueries where each j-th subquery is a three-way join of the result of the last subquery, distinct j items from the candidate itemsets, and the transaction table; and d) using the results of the last subqueries to determine which of the (n+2)-itemsets are frequent. In generating rules from the union of the frequent itemsets, all items from the frequent itemsets are first put into a table F. A set of candidate rules is created from the table fusing a table function. These candidate rules are joined with the table F, and filtered to remove those that do not meet confidence criteria.

The basic Apriori method, as taught by Agrawal, for finding frequent itemsets makes multiple passes over the data. In the k-th pass it finds all itemsets having k items called the k-itemsets. **Each pass consists of two phases**. Let F.sub.k

represent the set of frequent k-itemsets, and C.sub.k the set of candidate k-itemsets (potentially frequent itemsets). First, in **the candidate generation phase**, the set of all frequent (k-1)-itemsets, F.sub.k-1, found in the (k-1)-th pass, is used to generate the candidate itemsets C.sub.k. The candidate generation procedure ensures that C.sub.k is a superset of the set of all frequent k-itemsets. The algorithm builds a specialized hash-tree data structure in memory out of C.sub.k. Data is then scanned in the support counting phase. For each transaction, the algorithm determines which of the candidates in C.sub.k are contained in the transaction using the hash-tree data structure and increments their support count. At the end of the pass, C.sub.k is examined to determine which of the candidates are frequent, yielding F.sub.k. The algorithm terminates when F.sub.k or C.sub.k+1 becomes empty.

In summary, Agrawal teaches a method and apparatus for mining data relationships from an integrated database and data-mining system. **A set of frequent 1-itemsets is generated** using a group-by query on data transactions. From these frequent 1-itemsets and the transactions, **frequent 2-itemsets are determined**. A **candidate set of (n+2)-itemsets are generated from the frequent 2-itemsets**, where n=1. Frequent (n+2)-itemsets are determined from candidate set and the transaction table using a query operation. The candidate set and frequent (n+2)-itemset are generated for (n+1) until the candidate set is empty. Rules are then extracted from the union of the determined frequent itemsets.

Agrawal's teachings of different approach of joining and generation of frequency itemsets clearly teaches Applicant's claimed argument.

In response to Applicants' argument that Agrawal does not disclose claimed limitations in the cited section (cited location has nothing to do with applicant's invention). Examiner likes to point out that in the "Schering Corp. v. Geneva Pharmaceuticals Inc., 64 USPQ2d 1032 (DC NJ 2002) Decided August 8, 2002."

In the above case it is concluded that the prior art **disclosure need not be express in order to anticipate**. Even if a prior art inventor does not recognize a function of his or her process, the process can anticipate if that function was inherent. To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and **that it would be so recognized by persons of ordinary skill. Inherency is not necessarily coterminous with the knowledge of those of ordinary skill in the art**. Artisans of ordinary skill may not recognize the inherent characteristics or functioning of the prior art. However, the discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer. Insufficient prior understanding of the inherent properties of a known composition does not defeat a finding of anticipation.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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